What is claimed is:

1. An apparatus for conducting fluid in a fuel cell, the apparatus comprising

a unitary gas-impermeable body having:

a face having a recessed surface and a wall extending around said recessed surface, said recessed surface and said wall defining a fluid dispersion area;

a plurality of spaced apart protrusions protruding from said recessed surface in said fluid dispersion area such that portions of said recessed surface extend all around each of said protrusions, each protrusion having a protrusion surface spaced apart from said recessed surface; and

an inlet opening, an inlet conduit, an outlet opening and an outlet conduit, said inlet conduit being in communication with said inlet opening and said fluid dispersion area to facilitate communication of fluid from said inlet opening to said fluid dispersion area and said outlet conduit being in communication with said fluid dispersion area and said outlet opening to facilitate communication of fluid between said fluid dispersion area and said outlet opening.

2. The apparatus of claim **1** wherein said recessed surface is generally planar.

3. The apparatus of claim **2** wherein said recessed surface has a generally rectangular shape.

4. The apparatus of claim **2** wherein said recessed surface has a generally trapezium shape.

5. The apparatus of claim **2** wherein said recessed surface has a length and a width, said width decreasing from a first width adjacent said inlet opening to a second width adjacent said outlet opening.

6. The apparatus of claim **1** wherein said body includes a plate.

7. The apparatus of claim **1** wherein said inlet conduit comprises a first plurality of conduits and wherein said body further comprises a distribution area between said inlet opening and said first plurality of conduits for distributing fluid to said first plurality of conduits for communication to said fluid dispersion area.

8. The apparatus of claim **7** wherein said recessed surface has a length and a width, said width decreasing from a first width adjacent said inlet opening to a second width adjacent said outlet opening.

9. The apparatus of claim **7** wherein said outlet conduit comprises a second plurality of conduits and wherein said body further comprises a receiving area between said second plurality of conduits and said outlet opening for receiving fluid from said second plurality of conduits for exhaust through said outlet opening.

10. The apparatus of claim **1** wherein said body is formed from a castable electrically-conductive corrosion-resistant material.

11. The apparatus of claim **1** wherein said body is formed from graphite material.

12. The apparatus of claim **1** wherein said body is formed from a metal, said metal being coated with at least one of graphite powder, titanium, and gold.

13. The apparatus of claim **1** wherein said body is formed from a composite material.

14. The apparatus of claim **1** wherein said body is formed from a composite material, said composite material being coated with at least one of graphite powder, titanium, and gold.

15. The apparatus of claim **1** wherein each said protrusion surface has a generally curved shape.

16. The apparatus of claim **1** wherein each said protrusion surface has at least one of a rectangular, circular and triangular shape.

17. The apparatus of claim **1** wherein each said protrusion surface lies in a common plane.

18. The apparatus of claim **1** wherein said recessed surface has a total recessed surface area and wherein each said protrusion surface has a respective surface area and wherein a sum of said respective surface areas is approximately equal to said total recessed surface area.

19. The apparatus of claim **1** wherein said plurality of spaced apart protrusions are arranged in rows and columns.

20. The apparatus of claim **19** wherein alternate columns of protrusions are staggered relative to adjacent columns.

21. The apparatus of claim **1** wherein each said protrusion is spaced apart from adjacent protrusions by a common distance.

22. The apparatus of claim **1** wherein said protrusion surface is disposed approximately **0.5** mm to **0.8** mm from said recessed surface.

23. The apparatus of claim **1** wherein said body has a groove extending around said recessed surface, for receiving a seal for sealing said face to an adjacent component in the fuel cell.

24. The apparatus of claim **23** further comprising a first bridge member and wherein said face has a first support surface adjacent said inlet conduit for supporting said first bridge member over said inlet conduit.

25. The apparatus of claim **24** further comprising a second bridge member and wherein said face has a second support surface adjacent said outlet conduit for supporting said second bridge member over said outlet conduit.

26. The apparatus of claim **24** wherein said groove further comprises groove portions adjacent said first support surface, said seal including an inner portion operable to lie in said groove portions and wherein said first bridge member is operable to support said inner portion.

27. The apparatus of claim **1** wherein said body includes a plate, said face being on said plate and being generally flat.

28. The apparatus of claim **27** wherein said plate includes cooling means for cooling said plate, on a side of said plate opposite said face.

29. The apparatus of claim **28** wherein said cooling means includes parallel spaced apart grooves formed in said plate.

30. The apparatus of claim **28** wherein said protrusions are formed in an array, said array defining an active area of said plate and wherein said cooling means is disposed opposite said active area.

31. The apparatus of claim **29** wherein said body has an inwardly facing side and an outwardly facing side, said recessed surface being formed in said inwardly facing side, said inwardly facing side being operable to contact a gas diffusion layer of a membrane of said fuel cell and said grooves being formed in said outwardly facing side to facilitate cooling.

32. The apparatus of claim **28** wherein said body has an inwardly facing side and an outwardly facing side, said recessed surface being formed in said inwardly facing side, said inwardly facing side being operable to contact a gas diffusion layer of a membrane assembly of said fuel cell and wherein said cooling means is formed in said outwardly facing side and comprises:

a second recessed surface and a second wall extending around said second recessed surface, said second recessed surface and said second wall defining a second fluid dispersion area;

a second plurality of spaced apart protrusions protruding from said second recessed surface in said second fluid dispersion area such that portions of said second recessed surface extend all around each of said protrusions, each protrusion having a protrusion surface spaced apart from said second recessed surface; and

a second inlet opening operable to receive cooling fluid, a second inlet conduit, a second outlet opening and a second outlet conduit, said second inlet conduit being in communication with said second inlet opening and said second fluid dispersion area to facilitate communication of cooling fluid from said second inlet opening to said second fluid dispersion area and said second outlet conduit being in communication with said second fluid dispersion area and said second outlet opening to facilitate communication of said cooling fluid between said second fluid dispersion area and said second outlet opening.

33. The apparatus of claim **27** further comprising openings extending through said plate, adjacent said recessed surface, for receiving mounting devices therethrough, for mounting said plate in the fuel cell.

34. The apparatus of claim **1** further comprising an electrical conduit mount for mounting a first electrical conduit to said body such that said first electrical conduit extends generally perpendicular to said face of said body.

35. The apparatus of claim **34** further comprising a first electrical conduit connected to said electrical conduit mount, said first electrical conduit having a first circuit termination portion.

36. The apparatus of claim **35** further comprising an insulator on said first electrical conduit.

37. The apparatus of claim **1** further comprising mounting openings in said body for mounting said body to the fuel cell.

38. The apparatus of claim **1** further comprising a conduit opening in said body for receiving a conduit operable to conduct electrical power from said fuel cell.

39. A fuel cell stack apparatus comprising:

a first fuel cell membrane assembly having a proton exchange membrane and anode and cathode gas diffusion layers on opposite sides of said proton exchange membrane;

a first fluid supply apparatus comprising a gas impermeable body having a first inwardly facing side and a first outwardly facing side, said first inwardly facing side being in contact with said anode gas diffusion layer and having:

a first recessed surface and a first wall extending around said first recessed surface, said first recessed surface and said first wall defining a first fluid dispersion area;

a first plurality of spaced apart protrusions protruding from said recessed surface in said fluid dispersion area such that portions of said recessed surface extend all around each of said protrusions, each protrusion having a protrusion surface spaced apart from said recessed surface, said protrusion surfaces being operable to contact said anode gas diffusion layer;

a first inlet opening for receiving anode reactant fluid, first inlet conduit, first outlet opening and first outlet conduit, said first inlet conduit being in communication with said first inlet opening and said first fluid dispersion area to

facilitate communication of anode reactant fluid from said first inlet opening to said first dispersion area and said first outlet conduit being in communication with said first dispersion area and said first outlet opening to facilitate communication of anode reactant fluid between said first dispersion area and said first outlet opening; and

a second fluid supply apparatus comprising a unitary gas-impermeable body having:

a second inwardly facing side and a second outwardly facing side, said second inwardly facing side being in contact with said cathode gas diffusion layer and having a second recessed surface and a second wall extending around said second recessed surface, said second recessed surface and said second wall defining a second fluid dispersion area;

a second plurality of spaced apart protrusions protruding from said second recessed surface such that portions of said second recessed surface extend all around each of said protrusions, each protrusion having a protrusion surface spaced apart from said second recessed surface;

a second inlet opening operable to receive cathode reactant fluid, second inlet conduit, second outlet opening and second outlet conduit, said second inlet conduit being in communication with said second inlet opening and said second recessed surface to facilitate communication of cathode reactant fluid from said second inlet opening to said second recessed surface and said

second outlet conduit being in communication with said second recessed surface and said second outlet opening to facilitate communication of excess cathode reactant fluid and water from said cathode gas diffusion layer from said second recessed surface to said second outlet opening.

40. The apparatus of claim **39** wherein said second outwardly facing side of said second fluid supply apparatus comprises cooling means for cooling said second fluid supply apparatus.

41. The apparatus of claim **40** wherein said cooling means comprises:

a third face on said second fluid supply apparatus, said third face having a third recessed surface and a third wall extending around said third recessed surface, said third recessed surface and said third wall defining a third fluid dispersion area;

a third plurality of spaced apart protrusions protruding from said third recessed surface in said third fluid dispersion area such that portions of said third recessed surface extend all around each of said protrusions, each protrusion having a protrusion surface spaced apart from said recessed surface; and

a third inlet opening for receiving cooling fluid, a third inlet conduit, a third outlet opening for draining cooling fluid and a third outlet conduit, said third inlet conduit being in communication with said third inlet opening and said fluid dispersion area to facilitate communication of cooling fluid from said third inlet opening to said third fluid dispersion area and said third outlet conduit being in communication with said third

fluid dispersion area and said third outlet opening to facilitate communication of cooling fluid between said third fluid dispersion area and said third outlet opening.

42. The apparatus of claim **40** wherein said cooling means comprises a plurality of parallel grooves in said outwardly facing side of said second fluid supply apparatus said groves being operable to conduct cooling fluid to facilitate cooling of said second fluid supply apparatus.

43. The apparatus of claim **39** further comprising:

first and second current collector plates in contact with said first and second fluid supply apparatuses respectively, each of said first and second current collector plates having an inwardly facing side and an outwardly facing side;

first and second electrical conduits respectively secured to at least one of said inwardly and outwardly facing sides of said first and second current collector plates respectively;

first and second insulators on said first and second conduits respectively;

said first and second conduits being secured to said first and second current collector plates such that said first and second conduits extend through openings in components of the fuel cell and are insulated from said components by said first and second insulators, such that said first and second conduits extend from a same end of said fuel cell.

44. A fuel cell stack apparatus comprising:

a first fuel cell comprising a first membrane assembly having a first membrane and a first anode gas diffusion layer and a first cathode gas diffusion layer on opposite sides of said first membrane;

first anode and first cathode fluid distribution devices for supplying anode gas and cathode gas respectively to said first anode gas diffusion layer and said first cathode gas diffusion layer respectively; said first anode and cathode fluid distribution devices having first inwardly and first outwardly facing sides respectively, said first inwardly facing side of said first anode fluid distribution device being in contact with said first anode gas diffusion layer and said first inwardly facing side of said cathode fluid distribution device being in contact with said first cathode gas diffusion layer; and

said first outwardly facing side of said first cathode fluid distribution device having a first plurality of grooves formed therein for conducting cooling fluid to cool said first cathode fluid distribution device.

45. The fuel cell stack of claim **44** further comprising:

a second fuel cell comprising a second membrane assembly having a second membrane and a second anode gas diffusion layer and a second cathode gas diffusion layer on opposite sides of said second membrane;

second anode and second cathode fluid distribution devices for supplying anode gas and cathode gas respectively to said

second anode gas diffusion layer and said second cathode gas diffusion layer respectively, said second anode and cathode fluid distribution devices having second inwardly and second outwardly facing sides respectively, said second inwardly facing side of said second anode fluid distribution device being in contact with said second anode gas diffusion layer and said second inwardly facing side of said cathode fluid distribution device being in contact with said second cathode gas diffusion layer; and

said second outwardly facing side of said second anode fluid distribution device being in contact with said first outwardly facing side of said first cathode fluid supply device, said second outwardly facing side of said second anode fluid distribution device having a second plurality of grooves formed therein, said second plurality of grooves being aligned with said first plurality of grooves on said first cathode fluid distribution device to form cooling conduits for conducting cooling fluid.

46. A fuel cell stack apparatus comprising:

at least one fuel cell comprising a first membrane assembly having a first membrane and a first anode gas diffusion layer and a first cathode gas diffusion layer on opposite sides of said first membrane;

first anode and first cathode fluid distribution devices for supplying anode gas and cathode gas respectively to said first anode gas diffusion layer and said first cathode gas diffusion layer respectively, said first anode and cathode fluid distribution devices having first inwardly and first outwardly facing sides

respectively, said first inwardly facing side of said first anode fluid distribution device being in contact with said first anode gas diffusion layer and said first inwardly facing side of said cathode fluid distribution device being in contact with said first cathode gas diffusion layer;

first and second current collector plates in contact with said first and second fluid supply apparatuses respectively, each of said first and second current collector plates having an inwardly facing side and an outwardly facing side;

first and second electrical conduits respectively secured to at least one of said inwardly and outwardly facing sides of said first and second current collector plates respectively;

first and second insulators on said first and second conduits respectively;

said first and second conduits being secured to said first and second current collector plates such that said first and second conduits extend through openings in components of the fuel cell and are insulated from said components by said first and second insulators, such that said first and second conduits extend from a same end of said fuel cell.

47. A method of evacuating water from cathode gas diffusion layer of a fuel cell membrane assembly, said method comprising:

receiving water from said cathode gas diffusion layer in a dispersion area of a unitary gas-impermeable fluid supply apparatus having a plurality of protrusions protruding from a

recessed surface extending all around each said protrusion and contacting said cathode gas diffusion layer and being sufficiently spaced apart to permit said water to flow freely past said protrusions in said dispersion area; and

forcing cathode gas employed in a reaction in said fuel cell into said dispersion area in sufficient quantity to supply said gas to said reaction while using excess of said gas to force said water out of an outlet opening in said fluid supply apparatus, in communication with said dispersion area.

48. A fuel cell system comprising:

a fuel cell operable to receive fuel cell reactants and comprising a passageway for conducting cooling water therethrough; and

a humidifier connected to said fuel cell, said humidifier having a water inlet, a water disperser and a water outlet, said water inlet being operable to receive water from a water supply, said water disperser being operable to cause at least some of said water received at said water inlet to be absorbed into at least one reactant of said fuel cell and said water outlet being operable to receive unabsorbed water from said disperser and being in communication with said cooling passageway to direct said unabsorbed water to said cooling passageway for use in cooling said fuel cell.

49. The fuel cell system of claim **48** wherein said fuel cell comprises first and second reactant supply openings, at least one of said reactant supply openings being in communication with said disperser to receive humidified fuel cell reactant therefrom.

50. The fuel cell system of claim **48** wherein said fuel cell has first and second reactant supply openings and wherein said humidifier has first and second reactant supply ports and first and second reactant supply passages in communication with said first and second reactant supply ports respectively for receiving first and second fuel cell reactants respectively, said first and second reactant supply passages being in communication with said first and second reactant supply openings respectively such that said first and second reactants and said cooling water are supplied to said fuel cell through said humidifier.

51. The apparatus of claim **50** wherein said water disperser includes a first plate, a water permeable membrane and a second plate, said first plate having a plurality of channels extending between said water inlet and said water outlet, said second plate having a plurality of channels extending between at least one of said first and second reactant supply ports and a corresponding one of said first and second reactant supply passages, said first and second plates being disposed on opposite sides of said water permeable membrane to facilitate migration of water from said channels in said first plate to reactant in said channel in said second plate to humidify fuel cell reactant in said channels in said second plate.